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United States  
Department of  
Agriculture



Forest Service

Forest Health  
Technology  
Enterprise Team

Davis, CA

## FY 95 Accomplishments

### Forest Health Technology Enterprise Team-Davis



FPM 96-2  
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## FY 95 Accomplishments

### Forest Health Technology Enterprise Team-Davis

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## INTRODUCTION

### FHTET-Davis

The Forest Health Technology Enterprise Team-Davis is responsible for coordinating application technology development and is the only group in the USDA Forest Service with this mission. The staff consists of a director, a computer programmer analyst, and a program specialist. The program specialist is provided on detail by the USDA Natural Resources Conservation Service (NRCS), California State Conservationist, through a shared-services agreement. Administrative services - eg. office space, mail, limited purchasing, and duplication services are also provided by NRCS. We are very fortunate to be housed with and receive such fine support from our USDA partner.

Our primary contractors are Continuum Dynamics, Inc. (CDI) of Princeton, NJ, and the Missoula Technology and Development Center (MTDC). Work performed by CDI is integrated in this accomplishment report. Work by MTDC and their FY 95 accomplishments are reported in a separate report.

The accomplishments reported herein were possible through partnership with other FS units, other State and federal agencies, academia, and industry. Names of other cooperators are listed under goals and accomplishments. We join to express our special thanks to all those who supported us in FY 95.

The FY 95 combined administrative and technical budget, less salaries of the director and computer programmer analyst, was \$266K, a reduction of 8K from FY 94.

## Major Activities

Our major activities over the past several years have included:

- Coordinating national pesticide application technology within and outside the Forest Service;
- Coordinating national pesticide use management training;
- Chairing standing national steering committees;
- Developing partnerships with industry (equipment manufacturers and biological pesticide companies), other agencies, and academia to develop, evaluate, and transfer technology;
- Conducting technology transfer through publication of reports; editing of papers, book chapters, and books; conducting training and workshops; and presentation of posters and papers at professional meetings;
- Providing technical consultations to federal, state, academia, and industry in safe and efficient aerial use of pesticides. FSCBG aerial spray and fate model is used to assist in these consultations;
- Preparing newsletters and providing information and reports to FS and cooperators on application technology; and maintaining a library of references, reports, and publications;
- Seeking opportunities domestically and internationally in building partnerships for short-term, high pay-off technology; and
- Serving as FPM Sponsor/Coordinator of the FPM program at the Missoula Technology and Development Center and providing FPM oversight of the program.

## Emerging Opportunities

The FHTET-Davis staff is well positioned to support ecosystem management and the forest health initiatives. Pesticides, especially the biorational materials such as biopesticides and pheromones, will be required to support ecosystem management and forest health objectives. There are emerging needs to pursue development of pest management methodologies and equipment using natural compounds and organisms. Such work will be especially important in managing exotic pests, both current and future introductions. We see exotics as the major threat to ecosystem management and biodiversity. If the pattern continues, USD-ARS will focus on agricultural research, while Forest Service research will focus on basic forest research. This leaves FPM responsible for coordinating applied research, and development of methodologies and equipment to support application and dispersal of natural compounds and organisms for use in forest pest management, especially management of exotic organisms.



## ACCOMPLISHMENTS

### Introduction

Task accomplishments and missed opportunities are presented in the order that the task appears in the Forest Pest Management draft FY 95 FPM plan of work document. FHTET-Davis began FY 95 as a sub-staff of the WO/FPM, PUM&C staff. It, therefore, was part of PUM&C's plan of work. At mid-year the Davis staff joined the Ft. Collins and Morgantown staffs and formed the Forest Health Technology Enterprise Team. Davis continued pursuit of the tasks listed in the draft FY 95 plan of work.

We began FY 95 with an ambitious plan of work. Changes in staff and refocus of priorities, reduction in budgets, and reinvention processes have impacted on our original expectations.

In addition to the plan of work, other significant activities were accomplished and are reported beginning on page 15 of this report.



**GOAL #1: MAXIMIZE FOREST PEST MANAGEMENT EFFICIENCY WHILE MINIMIZING ADVERSE ENVIRONMENTAL AND SOCIAL IMPACTS ON LANDS OF ALL OWNERSHIPS**

**OBJECTIVE #1: IMPROVE FPM NATIONAL DIRECTION**

**TASK:**

- A. Submit Issue Paper to Director, FPM, for national and international integrated pesticide use and management training.
  - Deferred to FY 96 and to be coordinated by FHTET and PUM&C.
  
- J. Participate in Regional sponsored ecosystem management and Forest Health training programs and provide invited WO/FPM input that communicates pesticide use policy, roles, and opportunities in ecosystem management.
  - Participated in the National Silviculturist Workshop. WO/FPM staff interacted with others during FY 95 via several meetings, seminars, and conferences.

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**OBJECTIVE #3: IMPROVE PEST MANAGEMENT DELIVERY SYSTEM AT ALL LEVELS**

**TASK:**

C. Implement plan for a national database that will catalogue, enter and retrieve publications & reports related to pesticide application and environmental fate.

- In cooperation with Washington Office Information Systems and Technology (IS&T) staff all publications which are added to the FHTET-Davis library will be entered into the Forest Service INFO database. Currently all publications through FY 95 have been submitted to IS&T/WO. In addition, the report entitled "Bibliography of Pesticide Application Technology" has been updated to include all 14 categories of publications currently included in the FHTET-Davis library.

F. Coordinate and provide program direction for the FPM program at MTDC.

- We have realized significant accomplishments in advancing the FPM program at MTDC. Please refer to the FY 95 - Achievement Report MTDC/FPM Technology Development Program.

G. Coordinate FSCBG/AGDISP user training needs and conduct model runs for FS and cooperators.

Note: FSCBG (Forest Service-Cramer-Barry-Grim) is a computer model which predicts the behavior of spray material after it is released through nozzles into the wake of a spray aircraft, traveling through real atmospheric effects, penetrating canopy (trees or crops), and impacting the ground. The development of FSCBG was accomplished through partnership between USDA Forest Service, Forest Pest Management, Washington Office and US Army Dugway Proving Ground, UT. In 1995 the FSCBG user group currently has 154 active members comprised of 55 in the US, 77 in Canada, 16 in New Zealand, 4 in Australia, 1 in England, and 1 in Chile.

- Completed model runs at the request of Ed Monnig, R-1, to assist in developing aerial spray strategies for proposed application of Tordon 22K to restore winter elk range habitat on the Missoula Ranger District, Lolo National Forest, MT. The results were included in the EIS - Draft Environmental Impact Statement, Mormon Peak Ecosystem Restoration, Lolo

National Forest, Missoula Ranger District, August 1995.

- Completed model runs at the request of Jack Barry, FHTET-Davis, to compare downwind spray drift deposition between two aircraft, two boom/nozzle configurations, two formulations, and two release heights.
- Completed model runs at the request of Jim Hadfield, Forestry Sciences Lab, Wenatchee, WA to demonstrate how minor changes in input variables (release height, wind speed, temperature and humidity, and aircraft speed) can influence spray drift.
- Participated in training session with Continuum Dynamics, Inc. to become familiar with the latest improvements made to the FSCBG model. The training session resulted in a detailed summary of notes taken during the two-day session (FPM 95-19).
- Conducted Computer Assisted Spray Productivity Routine (CASPR) model runs to compare operational costs between a fixed-wing aircraft and rotary aircraft.

J. Participate in the WO technology development program review within FPM.

- The review was not scheduled by FPM.

K. Serve as session moderator and present papers at annual gypsy moth review and at the USDA Interagency Gypsy Moth Research Forum, Annapolis, MD.

- Moderated application technology session at the 1994 Annual Gypsy Moth Review.
- Presented paper on fate and airborne drift of Bt at the 1994 Annual Gypsy Moth Review.
- Co-authored with Bob Smith (Abbott Labs) paper titled "Soil persistence of *Bacillus thuringiensis* following aerial application" and presented the paper at the Sixth Annual Gypsy Moth Research meeting.

L. Review comments and recommendations for the 1994 FPM Directors meeting and the report of the 1994 National Steering Committee for Vegetation Management and develop courses of action.

- Recommendations have been reviewed and are being used in developing national pesticide policy.

- M. Coordinate input from pesticide coordinators on current and future roles of pesticide coordinators.
  - This was discussed at the Sacramento pesticide coordinators' meeting with consensus that future roles will not differ from current roles. (I do not agree with this consensus and suggest the issue be discussed again at the next pesticide coordinators' meeting.)
- O. Prepare year-end report of PUM&C accomplishments and distribute to Regions, Stations, and Area.
  - This report (FPM 96-2) is being distributed to Region, Station, and Northeast Area staffs.

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**OBJECTIVE #4: REDUCE ADVERSE ENVIRONMENTAL EFFECTS FROM THE USE OF PESTICIDES**

**TASK:**

C. Chair National Steering Committee - Seed, Cone, and Regeneration Insects.

- Conducted meeting of the committee at Coeur d' Alene, ID. Meeting and field trip, hosted by Sandra Kegley, provided productive and informative dialogue among S&PF cooperators. A report is in preparation.

D. Chair National Spray Model Advisory Committee.

- Meeting deferred to July 1996 to reduce travel costs. Meeting will be held in conjunction with the international meeting of the American Society of Agricultural Engineers.

G. Develop work plan with New Zealand Forest Research Institute to develop decision support systems for use of pesticides with focus on sensitivity to the environment.

- Meeting held at Missoula with the principal participating scientist last October to outline cooperative development for biological response decision support system. This DSS will have broad applications for non-target species and environmental protection.
- Work plan has been prepared.
- Arrangements have been made for Milt Teske (contractor) to be at FRI New Zealand October 25 - November 28, 1995, to connect biological response DSS to FSCBG model.
- Costs are being shared by FRI New Zealand, the New Zealand FSCBG user group, Milt Teske, and FHTET-Davis.

M. Develop a strategy, based upon partnerships, for evaluating the effects of non-biological/biorational pesticides on non-target species.

- Concept discussed with Mike McManus and Norm Dubois (NE), and John Anhold (R-4), and referred to FHTET-Morgantown who has non-target species responsibilities.

P. Provide recommendations to R-1 for mitigation of off-target drift of herbicides use to treat spotted knapweed.

- Conducted extensive FSCBG model runs to evaluate aerial application variables and meteorological regimes for applying Tordon to control spotted knapweed that has invaded important winter elk range.
- Provided detailed recommendations supported with graphics on procedures to conduct a quality application with minimal environmental impact. Recommendations are part of the EIS.

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**OBJECTIVE #5: DEVELOP, UPDATE, AND/OR IMPROVE INFORMATION DATA GATHERING SYSTEMS**

**TASK:**

B. Coordinate, gather and update database of annotated bibliography of western defoliator aerial field experiments, pilot, demonstration, and other projects and distribute to regions.

- This project was initiated upon recommendation of the national western defoliator steering committee in 1989. Pat Skyler annually coordinates with the Western Regions to obtain information on current projects and to produce a historic record of western defoliator aerial control projects. As no western defoliator aerial spray projects were conducted in FY 95, no changes were made to the database.

D. Prepare a regional summary of pesticide use and distribute to the regions.

- Pat Skyler's portion of this project included preparation of graphical presentations showing historical use of fungicides, herbicides, insecticides, predacides, and rodenticides by the Forest Service over a 10-year period. These graphs were used by WO/FPM as handouts in meetings with EPA and other USDA agencies.

**GOAL #1: MAXIMIZE FOREST PEST MANAGEMENT EFFICIENCY WHILE MINIMIZING ADVERSE ENVIRONMENTAL AND SOCIAL IMPACTS ON LANDS OF ALL OWNERSHIPS**

**OBJECTIVE #6: ENCOURAGE APPLICATION OF NEW TECHNOLOGY DEVELOPED BY RESEARCH TO ENABLE FOREST PEST MANAGEMENT TO MEET FS COMMITMENT TO INTEGRATED PEST MANAGEMENT**

**TASK:**

A. Serve as COR for FSCBG model enhancements, evaluation and technology transfer contract.

- This contract, which covers the enhancement of the FS developed Forest Service-Cramer-Barry-Grim (FSCBG) aerial spray model, was awarded on December 20, 1993. The overall goal of this contract is to develop and evaluate technologies that support the safe, environmentally sound and efficient use of biological and other pesticides. Technology transfer is a major emphasis. Twelve reports resulted from this project in 1995 as listed in the bibliography (FPM 95-12). New Zealand is using FSCBG to plan aerial herbicide operations, Canada has adapted it to assist in pesticide registration, and the US EPA also plans to adapt it for regulatory purposes.
- We recognize the partnerships with Dr. Brian Richardson, New Zealand Forest Research Institute and Dr. Bob Mickle, Environment Canada, for their scientific contributions and technology transfer of the model. We also express our appreciation to Dr. Milt Teske, contracting engineer, for his sustained superior performance in responding to FS technical needs and supporting technology transfer of the model and to Dr. Harold Thistle for his scientific contributions and development of partnerships.

B. Cooperate with University of California IPM Program in mutual technology transfer activities.

- Coopereated, at minimal cost to Forest Service, with University of California and Entotech, Inc. in conducting field test to support use of Bt in orchards as a replacement for chemicals that have a severe impact on raptors and other birds.
- FS developed technology transferred to state agricultural community.
- FS obtained canopy and drift deposition data for further validation/enhancement of FSCBG model.

- C. Analyze and report results of Bt environmental fate studies conducted on Gypsy Moth in Utah.
  - Data has been analyzed and combined results of the 1991-1993 studies will be reported in November 1995 at the Society of Environmental Toxicology and Chemistry International Congress (SETAC) at Vancouver, BC, November 1995.
- D. Coordinate FPM/MTDC technology development and cooperative projects with Forest Research Institute, New Zealand.
  - Coordination with MTDC and FRI has been continuous and productive in FY 95. We have begun work on the bio-response DSS and scientific personnel exchanges will occur this fall. A paper on the DSS will be presented at the SETAC meeting.
- E. Coordinate with MTDC in preparing MTDC/FPM program annual accomplishment report and update of 5-Year Plan.
  - MTDC accomplishment report has been reviewed and will be summarized at WO/FPM on October 17, 1995.
  - MTDC/FPM 5-Year Plan was updated and sent to WO for review.
- F. Tabulate and plot data from cooperative projects with New Zealand Forest Research Institute and University of California IPM Program.
  - Cooperative field project with FRI New Zealand not conducted in FY 95 due to resource limitations.
  - Conducted extensive data analyses of data from cooperative (1992 and 1994) IPM studies with University of California. Two publications have been completed (Roltsch et al. 1995 and Zalom 1995) and additional reports are in preparation.



**GOAL #2: MAXIMIZE INTERNAL AND PUBLIC TRUST IN FOREST SERVICE PEST MANAGEMENT PROGRAMS**

**OBJECTIVE #1: IMPROVE PEST MANAGEMENT KNOWLEDGE AND AWARENESS AT ALL LEVELS. ENABLE FOREST PEST MANAGEMENT TO MEET FS COMMITMENT TO INTEGRATED PEST MANAGEMENT**

**TASK:**

- A. Compile, edit, and distribute the monthly issues of the pesticide newsletter.
  - The pesticide newsletter "Short Subjects and Timely Tips for Pesticide Users" is compiled, edited, and mailed to over 200 addresses. Nine issues were prepared and distributed in FY 95.
- B. Prepare and distribute 1 or 2 issues of "FSCBG Model and Application Technology Transfer Notes."
  - A 17-page FSCBG model technology transfer letter was prepared and mailed September 1995 to over 170 cooperators including FSCBG user group members and international partners.
- C. Prepare proceedings of the 1994 Pesticide Coordinators' Meeting.
  - Notes were taken by Pat Skyler and Nancy Whitmire during the meeting, compiled by Pat Skyler, and sent to WO/FPM in October 1994.
- E. Review drafts of gypsy moth EIS and provide comments to EIS team.
  - Reviewed drafts and provided comments to the gypsy moth EIS documents.



## SIGNIFICANT OTHERS - FY 95

- Participated as a team member on the newly formed Forest Health Technology Enterprise Newsletter team.
- Participated with Bov Eav and Bill White in developing and launching the Forest Health Technology Enterprise Team (FHTET).
- Assisted John Ray, New Zealand Forest Research Institute, in locating information on a computer model for measuring drift from irrigation systems and a drop spectrum data base being worked on by Dennis Kincaid, Agricultural Research Service.
- Served as co-editor with Frank Hall, Ohio State University, and joined in the publication *Biorational Pest Control Agents - Formulation and Delivery*, American Chemical Society Symposium Series.
- Established Forest Service cooperation with Mike Newton in a joint Oregon State University and National Biological Survey ecosystem forest health management project.
- Cooperated with Mike Newton in conduct of herbicide ground sprayers to support the "Vegetation Management Options for Enhancing Ecosystem Health Management" project.
- Presented paper "Developing Technology - A Forest Health Partnership" at the 1995 National Silviculturist Workshop.
- Cooperated with Environment Canada on use of the FSCBG model to provide pesticide registration data.
- Developed a partnership that includes US Army, Department of Energy, Battelle NW, US Weather Service, MTDC, and FHTET-Davis to produce a field reference book for resource managers who are involved in weather-influenced projects.
- Cooperated with NA in advancing Gypses DSS and integrating FSCBG into Gypses.
- Cooperated with US Army (Dugway) and the USDA Fire Research Laboratory (Missoula) to conduct a field study on the wake effects beneath helicopters.

- Completed an innovative "real-time" version of FSCBG for use with onboard Global Positioning Systems to accurately predict the movement of aerially released materials as they are sprayed.
- Began a very positive contact with the American Mosquito Control Association, responding to their need for accurate predictive models (FSCBG). Coordinated and participated in a symposium on various aspects of aerial spraying.
- Cooperated with Jeff Witcosky (R-8) to implement his hardwood canopy database into FSCBG, thereby showing USDA Forest Service synergism.
- Provided field support to MTDC in conduct of the aircraft GPS trials on the Lolo National Forest.
- Provided assistance to IPM cooperators by conducting analysis of spray deposit cards using image analyzer and Automated Spot Counting and Sizing program (ASCAS).
- Published papers, prepared reports, and presented papers and posters (see pages 17-19).

## FPM/DAVIS REPORTS - FY 95

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Barry, J.W., M.E. Teske, and H.W. Thistle Jr. 1995. New aerial herbicide application technology. FPM 95-5. USDA Forest Service, Forest Pest Management, Davis, CA.

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Barry, J.W. 1995. Sixth Report - National steering committee for management of seed, cone, and regeneration insects. FPM 95-11. USDA Forest Service, Forest Pest Management, Davis, CA.

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Curbishley, T.B. 1995. FSCBG/D - The FSCBG demonstration system user guide. FPM 95-14 (C.D.I. Technical Note 94-29). Prepared under Contract No. 53-0343-4-00009 by Continuum Dynamics, Inc. for USDA Forest Service, Forest Health Technology Enterprise Team, Davis, CA.

MacNichol, A.Z. 1995. C-47 aircraft spray deposition - Part 2: FSCBG model prediction of deposition and biological response. FPM 95-8 (C.D.I. Technical Note No. 95-04). Prepared under Contract No. 53-0343-4-00009 by Continuum Dynamics, Inc. for USDA Forest Service, Forest Pest Management, Davis, CA.

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Teske, M.E. 1995. FSCBG/RT real-time model subroutines for spray cloud prediction. FPM 95-9 (C.D.I. Technical Note 94-20). Prepared under Contract No. 53-0343-4-00009 by Continuum Dynamics, Inc. for USDA Forest Service, Forest Health Technology Enterprise Team, Davis, CA.

Teske, M.E. and A.Z. MacNichol. 1995. Effect of upwind-downwind aircraft vortex decay on ground deposition. FPM 95-13 (C.D.I. Technical Note 95-02). Prepared under Contract No. 53-0343-4-00009 by Continuum Dynamics, Inc. for USDA Forest Service, Forest Health Technology Enterprise Team, Davis, CA.

Teske, M.E. 1995. *Bacillus thuringiensis* drift deposits on foliage and physical samplers - A summary of the Utah drift studies 1991-1993. FPM 95-18 (C.D.I. Technical Memo 95-11). Prepared under contract No. 53-0343-1-00153 by Continuum Dynamics, Inc. for USDA Forest Service, Forest Health Technology Enterprise Team, Davis, CA.

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USDA Forest Service. 1995. Draft environmental impact statement, Mormon Peak ecosystem restoration. Lolo National Forest, Missoula Ranger District, Missoula, MT.

Zalom, F.G. 1995. Annual report to the Almond Board of California - 94 C16 insect and mite research. Integrated Pest Management, University of California, Davis, CA. (USDA Forest Service, Forest Health Technology Enterprise Team, Davis, CA was a cooperator on this project).



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